

# ASTRO SPACE CENTER

## THE TUNNELING, THE SECOND ORDER RELATIVISTIC PHASE TRANSITIONS AND PROBLEM OF THE MACROSCOPIC UNIVERSE ORIGIN

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### ABSTRACT

We propose that the Universe created from "Nothing" with a relatively small particles number and it very quick relaxed to quasiequilibrium state at the Planck parameters. The classic cosmological solution for this Universe, with the calculation of it ability to be undergo to the second order relativistic phase transition ( RPT ), has two branches divided by gap. On one from these branches near to "Nothing" state the second order RPT isn't possible at GUT scale. Other branch is thermodynamically instable. The quantum process of tunneling between the cosmological solution branches and kinetics of the second order RPT are investigated by numerical methods. Other quantum geometrodynamics process (bounce from singularity) taken into consideration also. It is shown that discussed phenomenon with the calculaton of all RPT from scale GUT ( $10^{16}$  Gev) to Salam-Weinberg scale ( $10^2$  Gev) gives the new cosmological scenarios of the macroscopic Universe origin with observable particles number.

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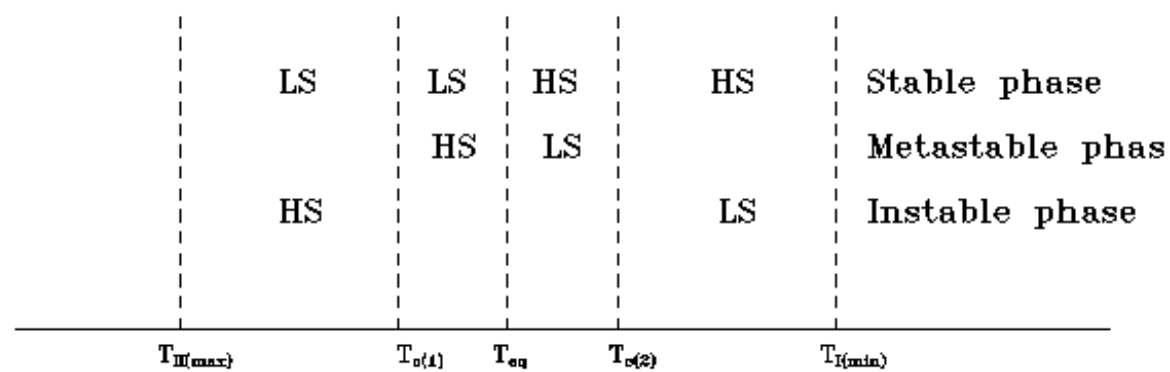


Fig.1

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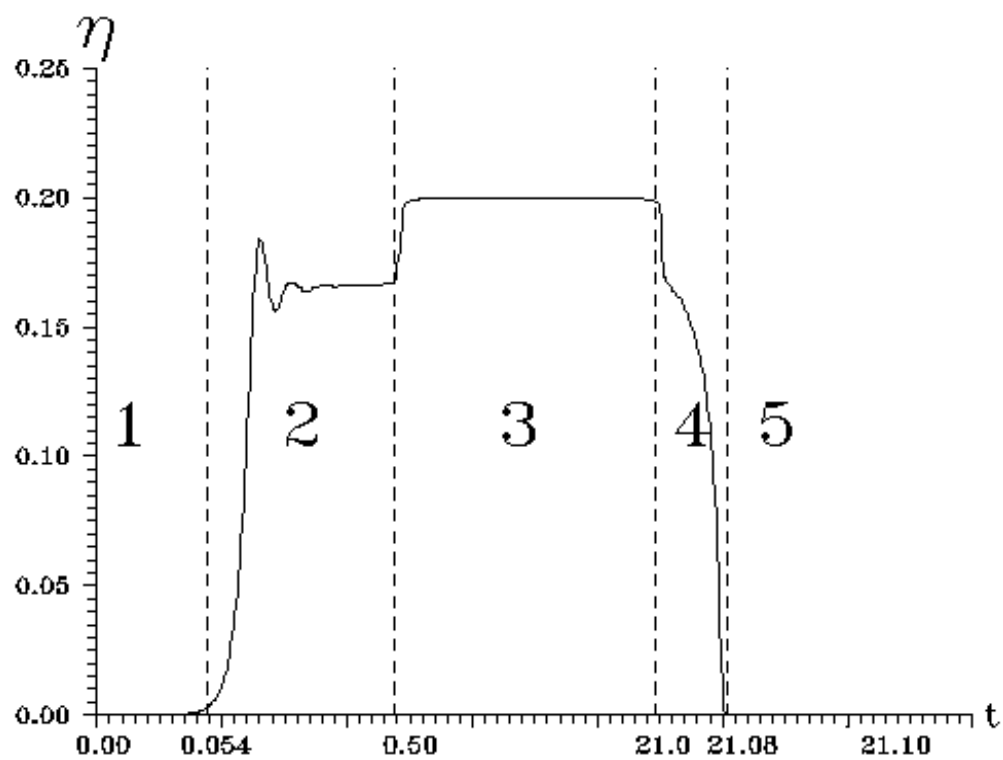


Fig.2



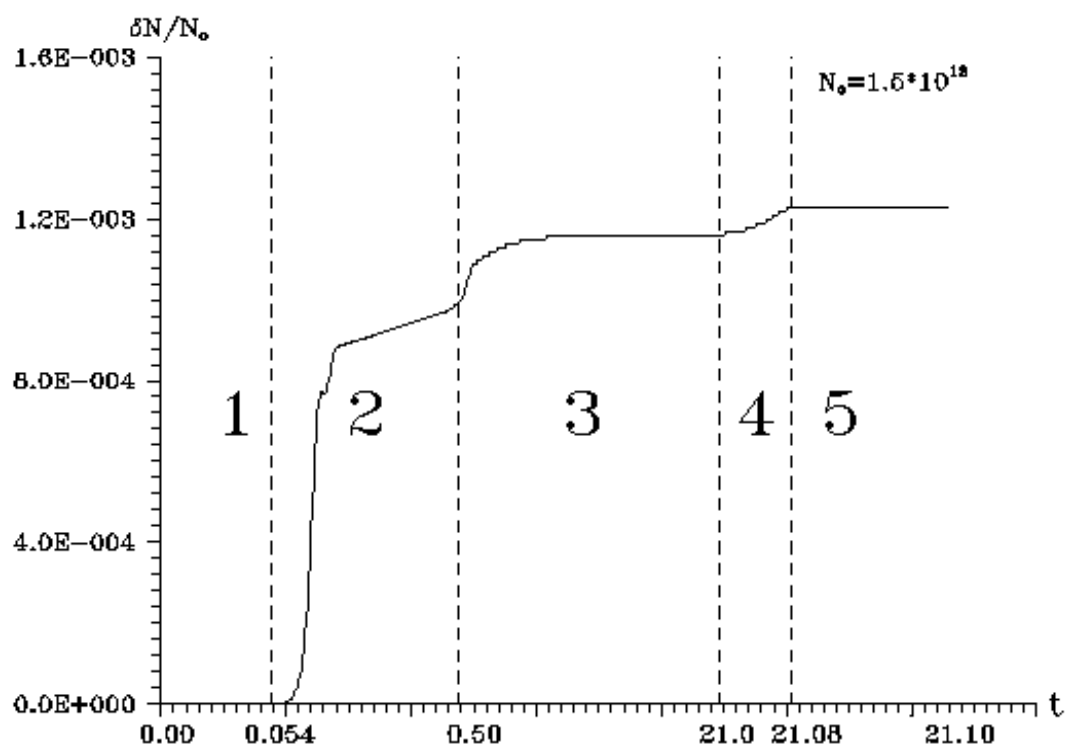


Fig.3



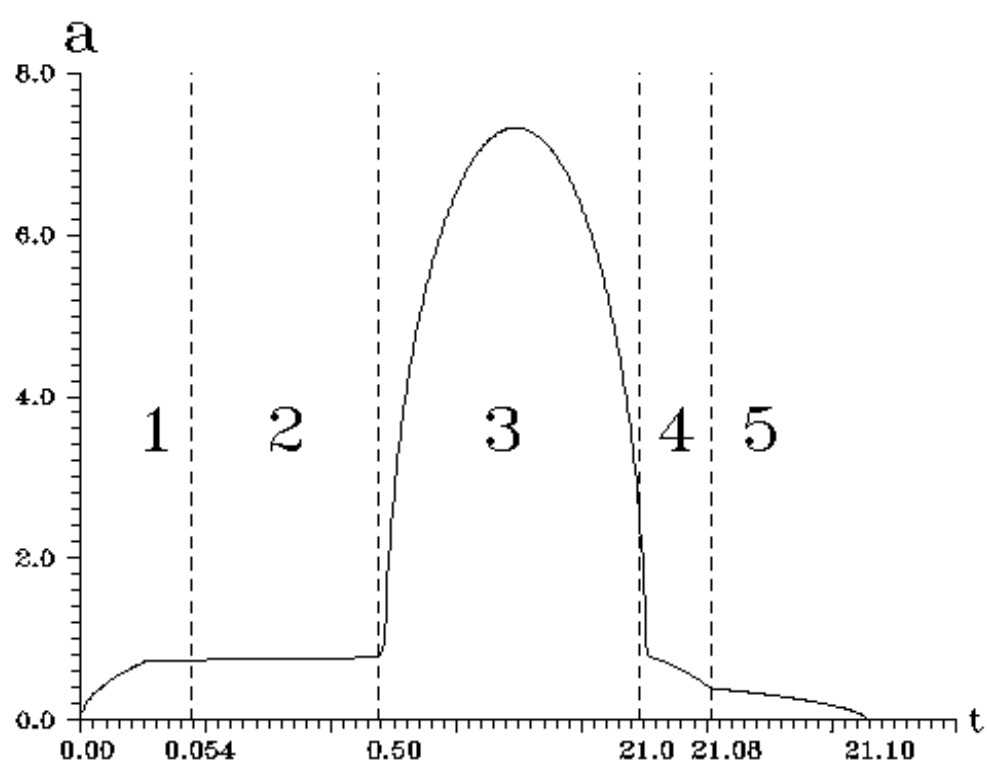


Fig.4





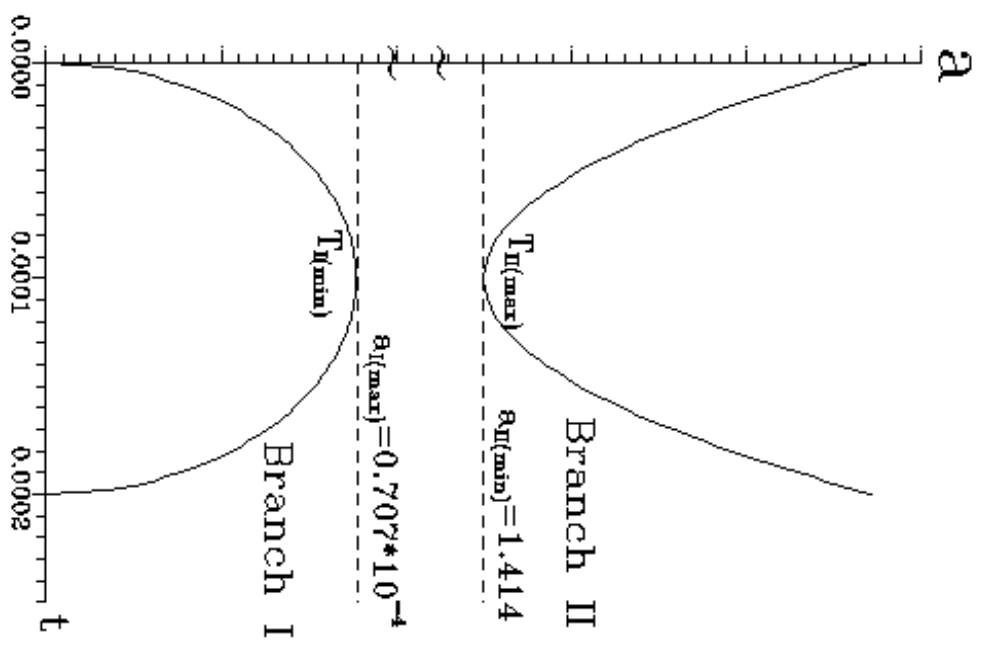


Fig.5



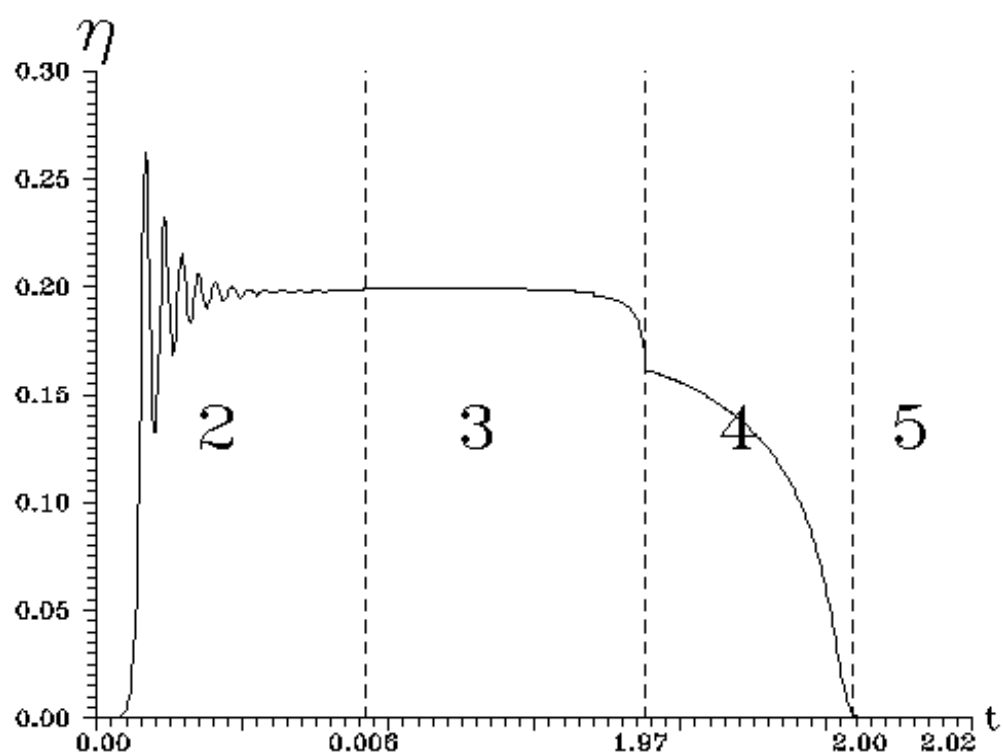


Fig.6



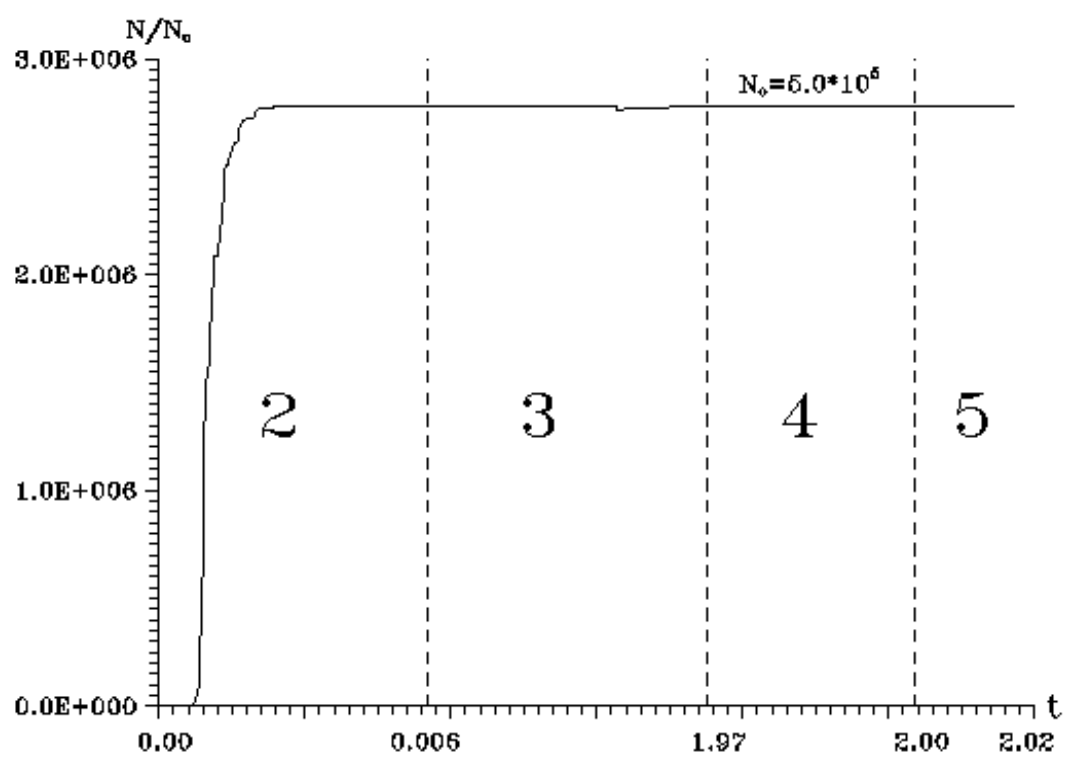


Fig.7



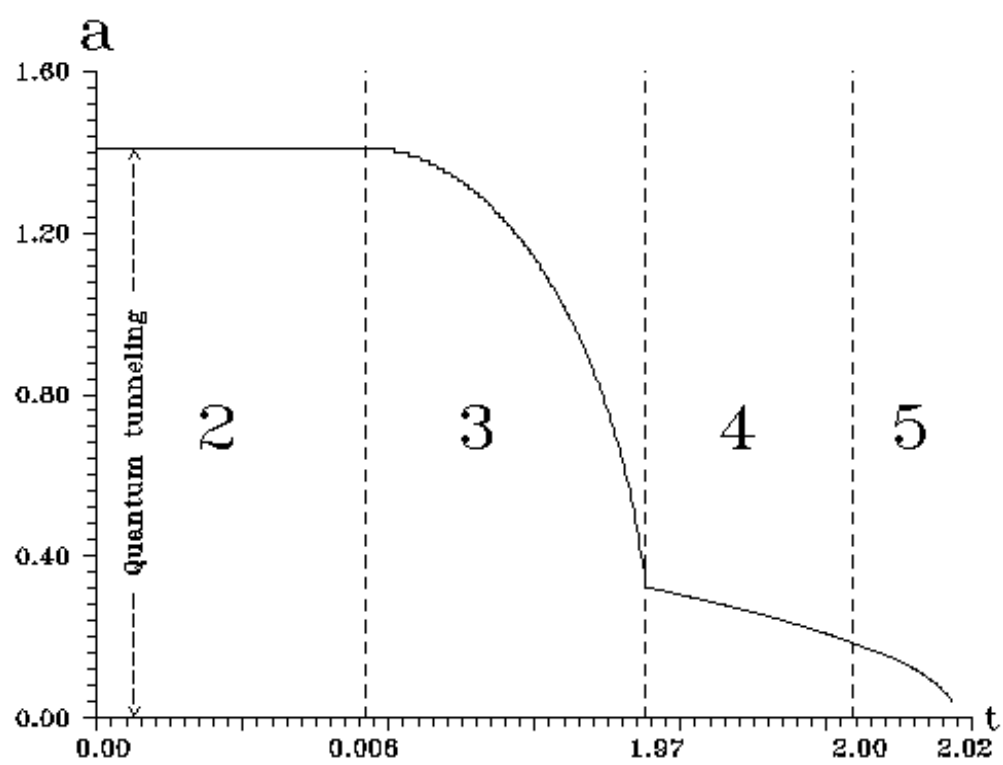


Fig.8





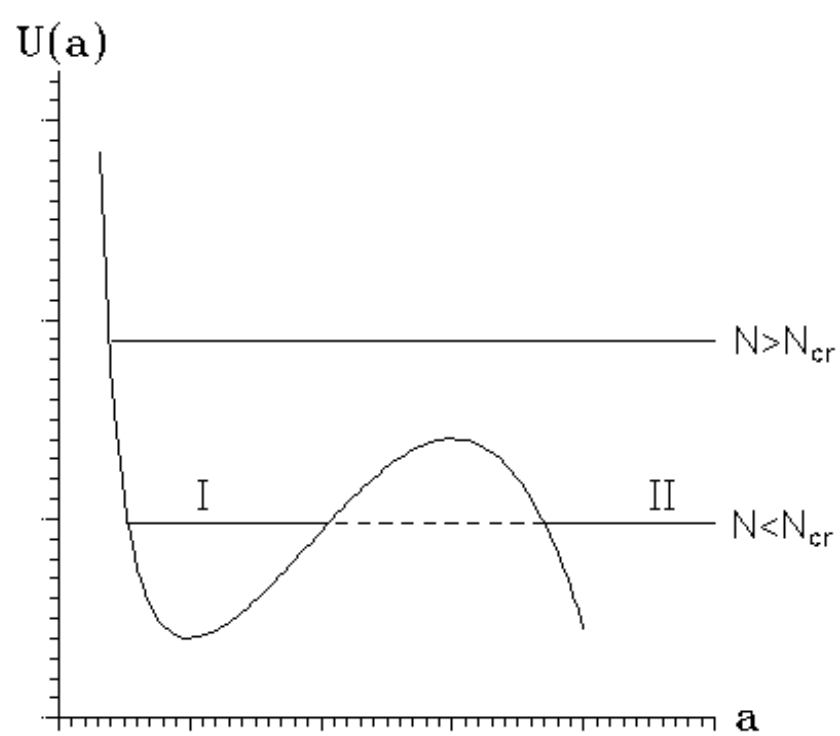


Fig.9

